

Department of the Interior  
U.S. Geological Survey

# **LDOPE's comp\_sds\_diff\_img Tool Documentation**

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## **comp\_sds\_diff\_img tool**

The Land Data Operational Product Evaluation (LDOPE) facility, collocated with the MODIS Adaptive Processing System (MODAPS) at Goddard Spaceflight Center (GSFC) in Greenbelt, MD, is responsible for the overall coordination of the Quality Assurance (QA) activities in support of the MODIS Science Team. LDOPE originally developed the **comp\_sds\_diff\_img** tool for internal use as part of their QA evaluation activities. This tool provides a basic capability to compare two versions of a MODIS image in Hierarchical Data Format (either continuous or discrete), and output differences based on user-defined thresholds.

**Software Platforms:** The **comp\_sds\_diff\_img** tool is available to compile, install and use on the following platforms:

1. Linux/Intel 32-bit
2. Linux/Intel 64-bit
3. Mac OSX/Intel 32-bit
4. Windows/Intel 32-bit

## **General Instructions**

1. Download the **comp\_sds\_diff\_img** package for your specific platform from the following location: [https://lpdaac.usgs.gov/lpdaac/tools/ldope\\_tools](https://lpdaac.usgs.gov/lpdaac/tools/ldope_tools)
2. **comp\_sds\_diff\_img** is a command line-based tool, so all you have to do is extract the executable for your specific platform on your local machine. The executable will reside in the “bin” directory under the “comp\_sds\_diff\_img” folder.
3. Once you bring up your “Command Prompt” (on Windows) or a “Terminal” on a Mac or Linux machine, you can launch the tool in command line.
4. **comp\_sds\_diff\_img** is a command line-based tool, that is generally averse to spaces – So, notwithstanding a visually cluttered syntax, try not to use spaces.
5. The executable itself is named “**comp\_sds\_diff\_img.**”
6. Either the “-help” or the executable by itself (“**comp\_sds\_diff\_img**”) will list out the complete syntax and its descriptions.
7. All output files are in HDF.
8. The “-esdt” flag has nothing to do with the actual Earth Science Data Type (ESDT) that represents your input dataset. This flag is designed to represent continuous versus discrete data:

- a. `-esdt=MOD09`: for all continuous data (i.e., MOD09 (surface reflectance), MOD13 (vegetation indices), MOD15 (LAI/fPAR) etc.).
  - b. `-esdt= MOD14|MOD10|MOD29`: for all non-continuous (discrete) data (i.e., MOD14 (fire), MOD10 (snow cover), MOD29 (sea ice)).
9. The “-meta” flag copies the metadata from the input file to that of the output.
  10. The “-geo” flag copies the geolocation science data set (SDS) (from the first input file if it exists) to the output file.
  11. The “-stat” flag outputs the percentage of the relative difference, and prints the percentage of observations within the relative differences on screen. This option is only applicable to continuous data (i.e., “-esdt=MOD09”). Specifying more than one threshold (separated by comma) is allowed.
  12. The “-qa” flag allows you to compare the QA SDS from two input files, and outputs a difference file. This option is only applicable to continuous data (i.e., “-esdt= MOD09”).
  13. The “-abs” flag allows you to compare and output a difference image that reports the negative through positive differences.

## **Tool Syntax & Description**

**comp\_sds\_diff\_img -help**

**comp\_sds\_diff\_img -esdt=<ESDT> -sds1=<f1,sds1> -sds2=<f2,sds2>  
-sds3=<f3,sds3> [-geo] [-meta] [-qa] [-abs] [-stat=threshold]**

This tool computes the differences between the two input SDSs and stores the actual signed differences or relative differences in an output HDF file, and displays percentage(s) of observations within a relative difference threshold or actual differences on screen. When the datasets contain discrete values, the output difference image will contain values identifying the change in the discrete levels. These values indicate match, commission and omission errors. The tool will also output counts of match, false and missed detections between the two inputs.

The esdt type option (`-esdt=MOD09`) identifies all MODIS inputs with continuous values. An SDS value range = [-1000 : 1000] with (scale = 10, offset = 0, fill value=2000, fill value indicates that the input dataset value is a fill value).

The esdt type option (-esdt=MOD10) is used for MODIS snow products only.

- 0: match
- 1: missed snow
- 2: false snow
- 3: missed lake ice
- 4: false lake ice
- 5: other difference

The esdt type option (-esdt=MOD14) is used for MODIS fire products only.

- 0: match
- 1: missed fire
- 2: false fire
- 5: other difference

-qa (this option is used only if the two input datasets are QA SDS)

2000: one of the inputs is a fill value

- 0: match
- 5: no match

This tool supports 2D/3D SDSs. You can specify the tool command arguments in any order.

## **Arguments**

-help                      Display this help message

-sds1=<f1,sds1>    The first filename and SDS names are separated by commas with no space.

To process a specific layer of a 3D SDS, specify the element number of the third dimension as a dot extension of the SDS name: **sds\_name.n** (e.g., sur\_refl\_b02.2 = the layer defined by the second element of the 3rd dimension of the 3D SDS sur\_refl\_b02). The 1st element of the 3rd dimension of the 3D SDS is used if no element number is specified.

`-sds2=<f2,sds2>` The second filename and SDS name are separated by commas with no space. To process a specific layer of a 3D SDS, handle it the same way as the first SDS.

`[-sds3=<f3,sds3>]` Output filename and SDS names are separated by commas with no space. The output SDS is two-dimensional.

`-esdt=<ESDT>` MOD09|MOD10|MOD14|MOD29  
Use MOD09 esdt for all continuous products, and use MOD10, MOD14, and MOD29 esdts for all discrete products.

`[-geo]` Copy geolocation SDS from the first input file to the output file if the geolocation SDS exists in the first input file.

`[-meta]` Copy the metadata from the first input file to the output file.

`[-qa]` Input is a qa SDS and output is the difference between input qa SDSs with no summary results printed to screen. Users may exercise this option for all ESDTs.

`[-abs]` Output differences (negative to positive) with no summary results printed to screen. This option is only for MOD09.

`[-stat=threshold list]` Output the percentage of relative difference and print percentage(s) of observations within relative difference threshold(s) to screen. Thresholds are separated by comma if more than one threshold is used. This option is only for MOD09.

## Syntax Examples:

```
comp_sds_diff_img -esdt=MOD09 -meta -geo -stat=1
-sds1='MOD13A1.A2003001.h09v05.005.2010232090847_base.hdf,500m 16 days NDVI'
-sds2='MOD13A1.A2003001.h09v05.005.2010231195858_new.hdf,500m 16 days NDVI'
-sds3=diff.MOD13A1.A2003001.h09v05.005.hdf,500m_16_days_NDVI_diff
```

```
comp_sds_diff_img -esdt=MOD09 -meta -geo -stat=1
-sds1='MODHDFSR.A2003001.h09v05.005.2010231112702_base.hdf,sur_refl_b01'
-sds2='MODHDFSR.A2003001.h09v05.005.2010231114502_new.hdf,sur_refl_b01'
-sds3=diff.MODHDFSR.A2003001.h09v05.005.hdf,sur_refl_b01_diff
```

comp\_sds\_diff\_img -esdt=MOD10 -meta -geo

-sds1=MOD10A1.A2003001.h09v05.005.2010231100856\_base.hdf,Snow\_Cover\_Daily\_Tile

-sds2=MOD10A1.A2003001.h09v05.005.2010231154155\_new.hdf,Snow\_CoverDaily\_Tile

-sds3=diff.MOD10A1.A2003001.h09v05.005.hdf,Snow\_Cover\_Daily\_Tile

comp\_sds\_diff\_img -esdt=MOD09 -meta -geo -abs

-sds1='MODHDFSR.A2003001.h09v05.005.2010231112702\_base.hdf,sur\_refl\_b01'

-sds2='MODHDFSR.A2003001.h09v05.005.2010231114502\_new.hdf,sur\_refl\_b01'

-sds3=diff\_abs.MODHDFSR.A2003001.h09v05.005.hdf,sur\_refl\_b01\_diff

## **Further help:**

If you have additional questions or concerns about this tool, please contact the LP DAAC:

LP DAAC User Services

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